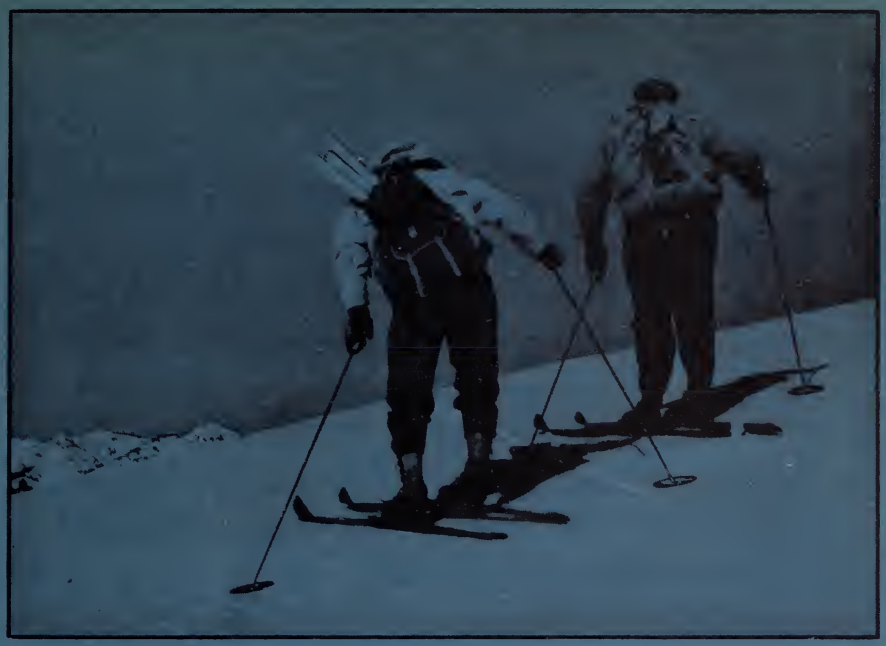

Snow Surveyors Climbing to a Snow Course

FEDERAL-STATE COOPERATIVE SNOW SURVEYS AND IRRIGATION WATER FORECASTS

for

MISSOURI and ARKANSAS DRAINAGE BASINS

FEBRUARY 1, 1946

By

Division of Irrigation, Soil Conservation Service

United States Department of Agriculture

and

Colorado Agricultural Experiment Station

Data included in this report were obtained by the agencies named above in cooperation with the U. S. Forest Service, National Park Service, State Engineers of Colorado, Wyoming and New Mexico and other Federal, State and local organizations.

February 1, 1946

WATER SUPPLY OUTLOOK

MISSOURI-ARKANSAS DRAINAGE BASINS

In Montana on all the watersheds of the Missouri and its tributaries, the snow conditions are favorable and runoff is expected to be normal. For Wyoming, generally, the situation is likewise favorable with a substantial amount of water held in reservoir storage. The outlook for water supply this season is good. North Platte and Laramie watersheds have excellent snow cover at the higher elevations. North Platte reservoirs are at a record filling for this time of year. South Platte and tributaries in Colorado have a good snow cover in the high mountains of the watersheds. Normal runoff may be expected this year. Reservoir storage is much above average. For the Arkansas drainage the snow cover on the headwaters is also normal, reservoir storage good, and no shortage in water supply may be expected this season. Throughout practically all the areas in Wyoming and Colorado the snow cover at lower elevations is very light.

MISSOURI RIVER AND TRIBUTARIES IN MONTANA

JEFFERSON: The recent snow surveys on this drainage area indicate an improvement in the water content over that of a year ago. It is 75 percent greater than last year and about 25 percent above normal for this time of the winter. The conditions now indicate that the runoff this season will be good providing the snow fall for the remainder of the winter and spring months approaches normal.

MADISON: Snow conditions on the headwaters of this stream appear to be excellent at this time. The water content now is double that of a year ago and 34 percent above normal. The coming season's runoff will be above that of last year and if normal snow fall occurs over this drainage during the remainder of the winter season the stage of this stream may reach near record height.

GALLATIN: The outlook for the coming season's runoff in the Gallatin is now good. Early winter snow fall, together with much above normal precipitation during January, has resulted in a substantial snow cover over the drainage area of this stream. The February first snow surveys show the water content to be more than twice that of a year ago and 34 percent above the 11-year average for this time of the winter. Prospects for a good irrigation water supply this coming summer are very favorable as indicated by the excellent snow cover on the headwaters of this river.

MARIAS: The snow cover on the drainage area of this stream is now over twice the depth measured a year ago and the water content 85 percent more. The snow condition is, at present, one-third above normal. As based on the conditions now existing it is reasonable to assume that the runoff in this stream this spring and early summer will be normal with expectation that a high state of flow may occur.

MISSOURI:(HELENA-GREAT FALLS): Like the other streams in the south central section of Montana the headwaters of the Missouri now have a good snow cover. The water content is three-quarters more than a year ago and nearly one-fifth above normal. At this time it appears that the runoff during the coming summer will be normal.

YELLOWSTONE: The snow cover on the headwaters of this stream, as based on recent snow surveys, has a water content one-third above normal for this period of the winter. Records are not available for comparison with last year at this time. Should normal snow fall occur for the rest of this winter and spring on the Yellowstone drainage the coming summer runoff will be normal or possibly somewhat in excess of normal.

For all the streams in this section of Montana it can be generally said that the prospects for the water supply next summer are very good at this time. Soil moisture is reported to be fair to good for the most part, with January precipitation about normal over most of the irrigated area along the Missouri and tributaries. The stream flow is holding up well and is considered average for this time of the year. Reservoir storage has changed little over the past month and is now about the same as last year at this time.

SHOSHONE RIVER

The snow cover on the watershed of this stream and its tributaries is much improved over that of a year ago. The water content is about 65 percent better than last February first and is about 20 percent above the past 11-year average. The density of the snow is good, being nearly 30 percent which is greater than usually found for this time in the winter. On the Project lands at Powell, Wyoming, the precipitation has been normal for the month of January and the area near and around Powell is now snow covered. Soil moisture is fair. In the Shoshone Reservoir is stored at this time 374,000 acre-feet of water which filling is at 82 percent of capacity. At this time there is little doubt as to the complete filling of this reservoir before the need of this supplemental water supply for irrigation next summer.

BIG HORN RIVER

The recent snow surveys on the headwaters of the Wind River (Big Horn River) and its tributaries show the water content of the snow pack to be on the average 8.5 inches which is about 60 percent more than last year at this time and is 12 percent above the 11-year average. For the Riverton Project the reservoir storage, Bull Lake and Pilot Butte combined, is 87,000 acre-feet, or about 20 percent more than a year ago. The Ray and Washakie reservoirs, serving the Indian Project at Wind River, have a combined storage of 8,000 acre-feet which is 25 percent more than last year at this time. Soil moisture over these projects is fairly good, ground frozen, and countryside bare of snow cover on the first of this month. Stream flow is generally normal. Because of the present favorable snow cover on the upper drainage area of the Wind River and its tributaries and the extent of stored water for use this coming season it is concluded that the water supply for irrigation this coming season will be ample. It is likely that the Riverton project reservoirs will fill to capacity by July 1st.

CHEYENNE RIVER

The outlook for the season's irrigation water supply is only fair at this time. On the Cheyenne drainage the water content of the snow cover the first of this month, 1.9 inches, was about two-thirds that of a year ago. This amount of snow water storage at this season of the year is insufficient to determine the actual runoff in the Cheyenne River this coming season. Should normal snow fall occur for the remainder of the winter and spring months in the Black Hills and adjacent areas the total runoff would in all probability be sufficient to practically fill the Fourche Reservoir which now holds 124,000 acre-feet of water. At this stage of filling it is at 63 percent of capacity. Last year at this time the storage was 119,000 acre-feet. Over the Belle Fourche Project the January precipitation was about 50 percent of normal and because of deficient late fall and early winter rainfall the soil moisture is now low. Stream flow, however, is good, being about 10 percent above the past 10-year average. At present the project area is bare of snow cover.

NORTH PLATTE RIVER

The snow cover on the North Platte drainage is now good. Recent snow surveys show the average water content of the snow pack on the headwaters to be 12 inches, which is one-half more than a year ago. The density is 28 percent. The present condition is about 25 percent above the past 11-year average. The indication now is for a normal runoff this season but it is not likely that it will exceed the April-July flow of 1945. May storms last year increased very materially the total flow

of the river last June and because of this a substantial reservoir carry-over was possible that now constitutes a safeguard or assurance of this season's irrigation water supply. The storage in the four principal reservoirs on the North Platte in Wyoming, February 1, 1945, was 407,000 acre-feet and for this date in 1946 it is 968,000, an increase over last year of about 140 percent. The amount of storage at this season of the year is probably an all time high. Over the farming areas in eastern Wyoming and western Nebraska, Torrington and Mitchell, served by the North Platte, the soil moisture is good and river flow normal. January precipitation has been subnormal and the area is at present free of snow cover. At Bridgeport, farther east in Nebraska, the soil moisture is fairly good, January precipitation below normal and the river flow about normal. Storage in the Kingsley Reservoir is now 1,062,000 acre-feet, last year at this time it was 691,000, or about one-half as much more. In the Casper area the rainfall has been deficient over the past few weeks, however, the soil moisture is fairly good. There is very little snow in this area at this time. In the North Park country the snow in the timbered areas is normal with light cover over the meadow lands. Soil moisture conditions are good, precipitation normal and stream flow about average for this time of year. Because of the present good snow cover, excellent reservoir storage in Wyoming and Nebraska and favorable soil moisture there appears to be a strong prospect now for an adequate water supply this coming summer for the North Platte irrigated areas.

SWEETWATER RIVER

The snow conditions on the Sweetwater drainage are very favorable at this time for a substantial runoff this coming season. Last year at this time the water content on the drainage was 3.9 inches and the recent snow surveys show the amount now to be 9.9 or an increase of about 150 percent. These measurements were taken at an elevation of approximately 9,000 feet.

LARAMIE RIVER

On the headwaters of the Laramie and tributaries the snow conditions are likewise good. As compared with last year at this time the average content is practically double and about 25 percent above the 11-year average. Both at Roach and Brooklyn Lake the snow depth is approximately 4 feet and contains respectively 12 and 14 inches of water. February first, 1943, the water content of the snow at Brooklyn Lake was 22 inches. The storage in the Wheatland reservoirs totals about 45,000 acre-feet, being more than 4 times the amount of a year ago. Over the farming area in the vicinity of Wheatland the soil moisture is normal, stream flow is good for this time of year and crop and range conditions very good. The outlook now for the coming season's irrigation water supply

is very promising, and there is no doubt but that the Wheatland reservoirs will fill to near capacity. The condition of the irrigated area in the Laramie district appears to be favorable, except that soil moisture is below normal, likewise the precipitation during January has been subnormal.

SOUTH PLATTE RIVER BASIN

CACHE LA POUDRE: Snow cover on the headwaters of the Poudre, and its tributaries, is at this time above the average. The recent snow surveys indicate the average water content of the snow to be 7.4 inches, 11-year average 6.2, while last year at this time it was 5.5. The best snow was found on the headwaters of the Big South where the depth is 4 feet with 14 inches of water. The depth on Cameron Pass is 3 1/2 feet and the cover contains 12 1/2 inches of water. On Deadman Hill it is 3 1/2 feet with a water content of 9 inches. The snow cover at Hour Glass Lake, headwaters of the Little South, is 2 feet deep and holds 3.7 inches of water which is the same as it was last year at this time. The storage in the Poudre Valley and mountain reservoirs is about twice the amount it was a year ago, now 42,000 acre-feet, last year 24,000. The streams are at normal stage and some storage has been accumulated in the valley reservoirs during the past several weeks. Generally the soil moisture throughout the irrigated area is below normal because of deficient precipitation. Dry weather and wind has been somewhat damaging to the winter wheat. As based on the present snow cover over the high mountain country of the Poudre drainage the outlook for the coming season's water supply is quite favorable. Because of the substantial carry-over in reservoir storage and above normal snow depths in the mountains at this time there is little likelihood of water shortage in the Poudre Valley this year.

BIG THOMPSON: On the headwaters of this stream the water content of the snow cover is now 9.9 inches which is about twice the 5.4 inches measured last year at this time. The 11-year average is 8.5 inches. The reservoir storage in the Loveland area is very good, being 41,000 acre-feet as compared with 32,500 a year ago. A good carry-over from last fall is largely the reason for this substantial addition to the water supply for this coming season. Stream flow is about normal and some further storage is being accumulated at this time. The spring runoff will be sufficient to fill the reservoirs to full capacity. Precipitation over the farming area of the Thompson Valley has been near normal but soil moisture is low. Heavy winds during January have been damaging to the winter wheat in some localities. The present prospects for the season's irrigation water supply are very promising.

ST. VRAIN: Snow on the headwaters of the St. Vrain is above normal. The snow surveys made February first show the watercontent of the cover to be 7.0 inches. Last year at this time it was 5.2 and the 11-year average 6.1. The present outlook is good for an ample irrigation supply this year and is strengthened because of the sizeable amount of water now in storage for use next year. In the vicinity of Longmont the precipitation has been normal and soil moisture satisfactory. The flow of the St. Vrain in the lower valley is much above normal and water is being accumulated in the reservoirs at this time.

BOULDER CREEK: On the headwaters of the North Fork of Boulder Creek the snow has a water content of 9.4 inches, last year at this time it was 5.8. The 11-year average is 6.0. Reservoir storage, both in the mountains and in the lower valleys of Boulder Creek and its tributaries, is about double that of a year ago. The streams are flowing at normal stage and storage continues. Precipitation throughout the irrigated area served by this stream and its tributaries has been normal and the present soil moisture condition is satisfactory. The prospects for this year's irrigation water supply are now good and since the snow cover and reservoir storage are well above normal at this time it is concluded that there will be ample water for crops this year.

CLEAR CREEK: For this drainage the water content of the snow pack on February 1 was 11.2 inches which is just twice that of a year ago at this time and about 3 1/2 inches more than the 11-year average which is 7.6. The reservoir storage in the lower valley of this stream is well above that of a year ago. Standley Lake, the principal reservoir, now holds 13,500 acre-feet, last year at this time 7,700. The outlook now for the coming season's irrigation water supply is very good. There is on the headwaters of this stream much above the average snow cover, reservoir storage is well above that of former years and soil moisture is now good. These facts all point, at this time, to a successful water year.

SOUTH PLATTE ABOVE DENVER: The snow on the headwaters of the main South Platte, Fairplay area, is now heavier than in the past several years, except 1943. The recent snow surveys reveal a water content of the cover to be 5.0 inches, in 1943 it was 5.5. Last year at this time it was 1.6 and the average for the past 11 years is 3.1. The flow in the river and tributaries is normal for this time of year and nominal reservoir storage occurred during the past several weeks. Winter flow is usually of small amount and consequently the filling of reservoirs is at a low rate. Antero Reservoir, in South Park, now holds 20,000 acre-feet in comparison with 12,600 a year ago. Eleven Mile is at capacity 81,900 and Cheeseman 74,500 or 95 percent capacity. The latter two reservoirs constitute the main water supply for the City of Denver. The outlook for a favorable runoff in the upper South Platte is now good and the valley lands served by water from this stream will experience no shortage this season.

For the South Platte basin as a whole the general prospect for this season's irrigation water supply is very good. The mountain snow cover is above normal at this time but there is a shortage of snow at low elevations. Throughout this whole area the storage in irrigation reservoirs is much better than a year ago. In the lower valley, Fort Morgan and Sterling areas, the several large reservoirs are now filled to within safe limits of capacity. These will fill during the early period of the spring runoff. The present storage is, Fort Morgan district 104,000 acre-feet, a year ago 73,000; for the Sterling district 108,000, a year ago 73,000; and for both districts the present exceeds last year's storage by about 50 percent.

ARKANSAS RIVER

As of the first of this month the snow cover on the headwaters of the Arkansas and its tributaries is good in comparison with former years at this season of the winter. The first-of-the-month snow surveys show, on the average, for nine courses a water content of 6.3 inches. Last year it was 4.7 and the 11-year mean 5.7. The best cover was found at Fremont Pass with a depth of 48 inches containing 11.4 inches of water. At the west portal of the Independence Pass Tunnel the snow depth is 49 inches containing 11.5 inches of water. This snow at the west portal is a source of water supply for Twin Lakes and is used on the lands adjacent to Ordway. The mountain and valley storage at this time in the principal reservoirs totals about 340,000 acre-feet as compared with approximately 290,000 a year ago or an excess of nearly 20 percent. The Great Plains system has some 115,000 acre-feet in storage. In the John Martin Reservoir (Caddoa) on the river near Las Animas there is nearly 45,000 in storage. Generally throughout the irrigated area of the river valley and the tributaries the precipitation has been more or less normal and the soil moisture conditions only fair. The soil is dry in the lower part of the valley. The river flow appears to be holding up well and is comparable to last year's stage at this time. Along the Fountain Valley the soil is dry and reservoir storage very good. In the Trinidad area the soil moisture is below normal, stream flow fairly good and range conditions satisfactory. The precipitation during January was above normal. In the Model Reservoir is stored 3,200 acre-feet, last year at this time it held 2,700.

For the Arkansas Valley the present outlook appears to be very favorable. The snow cover in the mountains is above normal and reservoir storage much in excess of that a year ago. It is not expected there will be a water shortage this coming season throughout the irrigated area from Canon City east to the Kansas State Line. Snow cover on the Fountain drainage is light at this time, however, storage is good. The outlook for the Purgatoire is only fair. Snow cover on this drainage is about 60 percent of that a year ago.

SNOW SURVEYS AND IRRIGATION WATER FORECASTS
FOR MISSOURI AND ARKANSAS RIVERS
February 1, 1946

PRECIPITATION DATA

WATERSHED	STATE	Precipitation October 1 to January 31	Departure from Normal	Precipitation January	Departure from Normal
		Inches	Inches	Inches	Inches
Missouri	East. Mont.	2.11	-0.34		
Missouri	Cent. Mont.	2.65	-0.44		
Missouri	North Wyo.	4.12	-0.25	0.92	-0.30
North Platte	Wyoming	2.52	-0.80	0.56	-0.27
South Platte	Colorado	4.06	+0.43	1.01	+0.34
Arkansas	Colorado	2.82	-0.62	0.78	+0.13

Accumulated precipitation since October 1, over the watersheds of the Missouri and Arkansas Rivers in Montana, Wyoming and Colorado is below normal except over the watershed of the South Platte. January precipitation also was below normal except over the South Platte and Arkansas drainages in Colorado. The shortage in accumulated precipitation is most pronounced on the North Platte drainage in Wyoming.

SUMMARY OF FEBRUARY 1 SNOW SURVEYS AND COMPARISON OF DATA

WITH THAT OF PREVIOUS YEARS BY WATERSHEDS

WATERSHEDS	Snow Depth			Water Content			Number courses in average	Snow Density			1946 Water Content in Percent of	
	Eleven Year Avg.*	1945	1946	Eleven Year Avg.*	1945	1946		Eleven year Avg.*	1945	1946	Eleven Year Avg.*	1945
	In.	In.	In.	In.	In.	In.		Percent	Percent	Percent		
MISSOURI RIVER												
Jefferson River	19.0	16.2	21.9	4.0	2.8	4.9	2	21	17	22	122	175
Madison River	42.7	32.5	53.0	11.4	7.6	15.3	6	27	23	29	134	201
Gallatin River	26.8	18.5	35.2	6.2	3.9	8.3	3	23	21	24	134	213
Yellowstone River	25.0	--	33.9	5.4	--	7.4	2	22	--	22	137	--
Missouri River**	20.7	15.3	24.8	4.8	3.2	5.6	4	23	21	23	117	175
Marias River	32.9	24.2	49.6	9.4	6.9	12.8	1	29	28	26	136	185
Shoshone River	41.6	29.1	47.0	11.4	8.2	13.6	2	27	28	29	119	166
Bighorn River	31.3	22.9	34.2	7.6	5.2	8.5	8	24	23	25	112	163
Cheyenne River	17.3	18.3	12.8	2.8	3.1	1.9	3	16	17	15	68	61
North Platte River	40.5	34.3	42.8	9.8	8.0	12.0	10	24	23	28	122	150
Sweetwater River	31.0	22.2	34.6	7.1	3.9	9.9	2	23	18	28	139	254
Laramie River	26.3	26.2	30.2	6.3	5.6	7.6	8	24	22	25	123	195
South Platte River***	17.8	13.1	23.8	3.1	1.6	5.0	3	17	12	21	161	312
Crow Creek	13.0	15.1	7.3	2.5	2.7	1.2	1	19	18	16	48	44
Poudre River	26.0	25.0	30.4	6.2	5.5	7.4	6	24	22	24	120	134
Big Thompson River	34.6	27.5	38.0	8.5	5.4	9.9	2	25	20	26	117	183
St. Vrain River	27.2	25.1	34.0	6.1	5.2	7.0	1	22	21	21	115	135
Boulder Creek	21.8	23.0	29.8	6.0	5.8	9.4	2	28	25	31	157	162
Clear Creek	33.1	27.6	43.2	7.6	5.5	11.2	2	23	20	26	148	204
ARKANSAS RIVER	26.5	23.2	26.6	5.7	4.7	6.3	9	21	20	24	110	134

*Some for shorter periods. **Missouri River, Helena-Great Falls. ***Above Denver, Colo.

MISSOURI AND ARKANSAS RIVER WATERSHEDS

Summary of Federal and State Cooperative Snow Surveys

Issued February 12, 1946, at Fort Collins, Colo.

No.	Main Drainage and Snow Course	Local Drainage	Location: State	Locality	Description	Elev.	National Forest	Feb. 1 Snow Cover Measurements: Av. Snow Depth: Av.@	1945	1946	Av. Water Content: Av.@	1945	1946
								In.	In.	In.	In.	In.	In.
	JEFFERSON RIVER												
6	Camp Creek*	Red Rock Cr.	Idaho	6mi.N.Spencer	21-13N-36E	6800	Targhee	24.4	22.0	29.0	5.3	4.0	7.0
7	East Fork R.S.	Rock Creek	Mont.	13mi.NE.Sula	16-2N-17W	5400	Bitterroot	--	--	--	--	--	--
10	Gibbons Pass	N.Fk.BigHole	Mont.	Gibbons Pass	4-2S-19W	7100	"	49.1	--	73.5	13.0	--	18.1
30	Pipestone Pass	Pipestone Cr.	"	Pipestone Pass	11-1N-7W	7200	Deerlodge	13.7	10.4	14.8	2.6	1.5	2.8
				Average for Drainage				19.0	16.2	21.9	4.0	2.8	4.9
	MADISON RIVER												
2	Aster Creek*	Firehole R.	Wyo.	Lewis Lake	44.3N110.6W	7700	Yel.Nat.P.	46.3	36.0+	59.4	13.5	9.1+	19.6
8	Lewis L.Divide*	" "	"	3mi.S.Lewis L.	44.2N110.7W	7900	" " "	64.2	52.0+	78.0	20.3	13.5+	28.8
3	Big Springs*	South Fork	Idaho	Big Springs	34-14N-44E	6500	Targhee	44.8	30.0	54.3	11.0	7.0	13.6
16	West Yellowstone	South Fork	Mont.	W.Yellowstone	34-13S-5E	6700	Gallatin	30.0	23.0	36.4	6.8	4.7	8.2
	Twenty-one Mile*	Greyling Cr.	"	8mi.S.Gallatin	1-11S-5E	7150	Yel.Nat.P.	37.8	27.3	49.7	9.3	5.7	12.3
	Hebgen Dam	Cabin Creek	"	Hebgen Dam	22-11S-4E	6550	Gallatin	32.9	26.0	40.3	7.5	5.7	9.5
	Valley View	Denny Cr.	Idaho	5mi.E.Henry's L.	7-15N-44E	6500	Targhee	--	---	--	---	--	--
				Average for Drainage				42.7	32.5	53.0	11.4	7.6	15.3
	GALLATIN RIVER												
	Mystic Lake No.1	Bozeman Cr.	Mont.	12mi.SE.Bozeman	31-3S-7E	6600	Gallatin	22.8	16.5	29.4	5.1	3.4	6.6
	Mystic Lake No.2	" "	"	" " "	31-3S-7E	6600	"	19.8	11.7	26.5	4.3	2.6	5.9
	Twenty-one Mile	Gallatin River	"	8mi.S.Gallatin	1-11S-5E	7150	Yel.Nat.P.	37.8	27.3	49.7	9.3	5.7	12.3
				Average for Drainage				26.8	18.5	35.2	6.2	3.9	8.3
	YELLOWSTONE RIVER												
40	Lupine Creek	Lupine Creek	Wyo.	11mi.SE.Gardiner	44.9N110.6W	7300	Yel.Nat.P.	24.0	--	32.3	4.9	--	6.7
41	Blacktail DeerCr.	Blk.Tail D.Cr.	"	" " "	44.9N110.6W	7500	" " "	26.1		35.5	6.0		8.1
				Average for Drainage				25.0		33.9	5.4		7.4

*On adjacent drainage

+Readings Jan. 17

@Average for period of record.

MISSOURI AND ARKANSAS RIVER WATERSHEDS

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								In.	In.	In.	In.	In.	In.
	MISSOURI RIVER**												
6	Chessman Res.	Tenmile Cr.	Mont.	11mi. SW. Helena	2-8N-5W	6200	Helena	11.1	7.4	12.0	2.5	1.4	2.6
41	Tenmile Cr. Lower	Tenmile Cr.	"	17mi. SW. Helena	13-8N-6W	6250	"	18.2	13.6	21.4	3.9	2.7	4.0
42	Tenmile Cr. Middle	" "	"	" " "	13-8N-6W	6800	"	24.9	19.2	30.4	5.7	3.6	6.5
43	Tenmile Cr. Upper	" "	"	" " "	19-8N-5W	8000	"	28.8	21.0	36.0	7.3	5.0	9.3
					Average for Drainage			20.7	15.3	24.8	4.8	3.2	5.6
	MARIAS RIVER												
20	Marias Pass	Two Medicine	"	Summit	48.3N113.4W	5250	Glacier NP	32.9	24.2	40.6	9.4	6.9	12.8
	SHOSHONE RIVER												
32	Sylvan Pass	Middle Creek	Wyo.	Sylvan Pass	12-52N-110W	7100	Yel. Nat. P.	37.6	26.2	38.2	10.5	7.6	10.9
50	Brooks Lake #3*	Shoshone R.	Wyo.	Brooks Lake	23-44N-110W	9200	Shoshone	45.5	32.0	55.9	12.3	8.9	16.2
					Average for Drainage			41.6	29.1	47.0	11.4	8.2	13.6
	BIGHORN RIVER												
12	Togwotee Pass	Wind River	Wyo.	Togwotee Pass	29-44N-110W	9600	Teton	59.3	48.0	70.0	17.2	13.4	19.7
14	Dome Lake*	Goose Cr.	Wyo.	Dome Lake	11-53N-87W	8800	Bighorn	--	18.7	--	--	5.0	--
45	Sawmill Glade	Popo Agie R.	"	13mi. SW. Lander	3-31N-101W	8500	Shoshone	19.6	16.3	15.7	4.0	3.2	3.1
46	Blue Ridge	" " "	"	15mi. " "	23-31N-101W	9500	"	27.6	17.6	29.4	5.9	2.6	6.9
47	South Pass	L. Popo Agie R.	"	19mi. " "	13-30N-101W	9000	"	30.7	20.8	35.9	7.0	3.6	10.0
49	Sheridan Cr. R.S. #2	Sheridan Cr.	"	16mi. N.W. Dubois	3-42N-109W	7500	"	21.7	16.4	21.9	4.5	3.5	3.2
50	Brooks Lake #3	Wind River	"	Brooks Lake	23-44N-110W	9200	"	45.5	32.0	55.9	12.3	8.9	16.2
51	St. Lawrence R.S.	St. Lawrence Cr.	"	27mi. NW. Lander	26-1N-4W	9000	Shos. I.R.						
52	Mosquito Park RS	Trout Creek	"	18mi. " "	23-2S-3W	9500	" " "						
53	DuNoir	Wind River	"	9mi. NW. Dubois	27-42N-103W	8750	Shoshone	25.4	20.9	24.8	5.8	4.1	5.5
54	T-Cross Ranch	Horse Creek	"	12mi. N. Dubois	1-43N-107W	8000	"	20.3	11.5	20.3	4.5	2.2	3.5
					Average for Drainage			31.3	22.9	34.2	7.6	5.2	8.5

*On adjacent drainage

@Average for period of record

**Between Helena and Great Falls

MISSOURI AND ARKANSAS RIVER WATERSHEDS

Summary of Federal and State Cooperative Snow Surveys

Issued February 12, 1946, at Fort Collins, Colo.

No.	Main Drainage and Snow Course	Local drainage	Location: State	Location: Locality	Location: Description	Elev.	National Forest	Feb. 1 Snow Cover Measurements: Av. Snow Depth: Av.@	Av. Snow Depth: 1945	Av. Snow Depth: 1946	Av. Water Content: Av.@	Av. Water Content: 1945	Av. Water Content: 1946
								In.	In.	In.	In.	In.	In.
	No.PLATTE RIVER												
1	Cameron Pass	Michigan Cr.	Colo.	Cameron Pass	2-6N-76W	10300	Roosevelt	39.4	37.5	43.8	9.4	9.7	12.4
7	Park View	Illinois Cr.	"	7mi.SE.Rand	24-5N-78W	9200	Routt	23.5	22.8	23.4	5.0	3.0	9.1
@	Columbine Lodge	Grizzly Cr.	"	Rbt.Ears Pass	21-5N-82W	9300	"	51.8	46.3	63.7	12.8	10.8	16.2
62	Willow Creek P.*	Illinois Cr.	"	Willow Cr.Pass	1-4N-78W	9500	Arapaho	29.1	25.5	29.1	6.6	3.9	11.4
7	Bottle Creek	Encmomnt Cr.	Wyo.	7mi.SW.Encmomnt	24-14N-85W	8200	MedicineBow	28.8	23.0	28.4	6.7	5.8	6.9
8	Webber Soring	" "	"	10mi.W. "	27-14N-85W	9000	" "	36.4	29.7	38.0	8.6	7.4	9.4
9	Old Battle	" "	"	12mi.W. "	29-14N-85W	9800	" "	60.8	47.9	59.5	16.4	14.0	18.7
37	North French Cr.	N.French Cr.	"	Cent/Saratoga	27-16N-80W	10200	" "	59.4	51.0	67.7	15.6	13.4	19.9
38	N.Barrett Cr.#2	Barrett Cr.	"	" "	30-16N-80W	9400	" "	45.7	36.1	46.4	10.8	7.9	11.2
39	Ryan Park #2	" "	"	" "	34-16N-81W	8400	" "	30.1	23.2	27.7	6.2	4.4	4.7
					Average for Drainage			40.5	34.3	42.8	9.8	8.0	12.0
	SWEETWATER RIVER												
29	Grannier Meadows	Rock Creek	Wyo.	20mi.SW.Lander	19-30N-100W	9000	Shoshone	31.3	23.6	33.3	7.2	4.2	9.8
47	South Pass*	" "	"	19mi. " "	13-30N-101W	9000	"	30.7	20.8	35.9	7.0	3.6	10.0
					Average for Drainage			31.0	22.2	34.6	7.1	3.9	9.9
	LARAMIE RIVER												
3	Brooklyn Lake	Nash Fork	Wyo.	7mi.NW.Cntennl	11-16N-79W	10200	MedicineBow	40.5	39.1	46.8	11.7	9.4	13.9
11	Fox Park	Fox Creek	"	Fox Park	21-13N-78W	9200	" "	22.4	23.6	25.4	5.0	4.7	6.1
34	Pole Mountain#2*	Soldier Cr.	"	10mi.SE.Laramie	35-15N-72W	8700	" "	13.0	15.1	7.3	2.5	2.7	1.2
35	Libby Lodge #2	Libby Creek	"	3mi.NW.Cntennial	29-16N-77W	8700	" "	21.1	19.2	25.7	4.7	3.7	6.3
36	Hairpin Turn #2	Nash Fork	"	5mi.NW. "	24-16N-79W	9500	" "	23.7	21.4	26.9	5.6	4.1	6.7
4	W.Port.G-P.Tunnel	Laramie R.	Colo.	4mi.N.Chambers L	7-8N-75W	8600	Roosevelt	20.9	21.9	26.4	4.8	5.5	5.5
50	Deadman Hill*	Deadman Cr.	"	10mi.W.R.Feather	26-10N-75W	10200	"	31.4	33.1	39.6	7.0	6.5	9.1
88	Roach	LaGarde Cr.	"	8mi.NW.Glendevy	5-10N-77W	9800	"	37.7	36.0	43.2	8.8	8.5	11.8
					Average for Drainage			26.3	26.2	30.2	6.3	5.6	7.6

*On adjacent drainage

@Average for period of record

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								In.	In.	In.	In.	In.	In.
	CHEYENNE RIVER												
1	Upper Spearfish	Spearfish Cr.	S.Dak.	21mi.SW.Spearfish	21-3N-1E	6500	BlackHills	20.7	21.5	14.7	3.8	4.3	2.3
2	Upper Castle	Castle Cr.	" "	11mi.NW.Deerfield	24-2N-1E	6800	" "		20.4			3.1	
3	Deerfield	Silver Cr.	" "	3mi.NW.Deerfield	23-1N-2E	6010	" "		13.1			1.9	
					Average for Drainage				18.3			3.1	
	SOUTH PLATTE RIVER**												
14	Hoosier Pass	S.Platte R.	Colo.	Hoosier Pass	13-8S-78W	11400	Pike	25.9	16.4	33.2	5.0	2.4	7.6
15	Fairplay	" " "	"	Fairplay	33-9S-77W	10000	"	4.8	4.7	5.0	0.5	0.6	0.5
83	Jefferson Cr.#2	Jefferson Cr.	"	5mi.NW.Jefferson	14-7S-76W	10100	"	22.8	18.2	33.1	3.8	1.8	6.8
					Average for Drainage			17.8	13.1	23.8	3.1	1.6	5.0
	CROW CREEK												
34	Pole Mountain #2	Crow Creek	Wyo.	10mi.SE.Laramie	35-15N-72W	8700	MedicineBow	13.0	15.1	7.3	2.5	2.7	1.2
	POUDRE RIVER												
1	Cameron Pass	JoeWright Cr.	Colo.	Cameron Pass	2-6N-76W	10300	Roosevelt	39.4	37.5	43.8	9.4	9.7	12.4
2	Chambers Lake	Poudre River	"	Chambers Lake	6-7N-75W	9000	"	15.6	17.7	21.3	4.0	4.5	4.8
3	Big South	" "	"	2mi.E.Chambers L.	33-8N-75W	8600	"	5.0	6.9	5.0	1.1	1.8	1.1
50	Deadman Hill	N.Poudre R.	"	10mi.W.R.Feather	26-10N-75W	10200	"	31.4	33.1	39.6	7.0	6.5	9.1
65	Lake Irene*	Big S.Poudre	"	1mi.SW.Milner P.	8-5N-75W	10600	Ry.Mtn.N.P.	44.8	34.3	49.0	11.8	6.7	13.6
68	Hour Glass Lake	L.S.Poudre	"	2mi.NW.Pingree P.	13-7N-73W	9500	Roosevelt	19.5	20.8	23.4	3.8	3.7	3.7
					Average for Drainage			26.0	25.0	30.4	6.2	5.5	7.4
	BIG THOMPSON												
65	Lake Irene*	BigThompson R.	Colo.	1mi.SW.Milner P.	8-5N-75W	10600	Ry.Mtn.N.P.	44.8	34.3	49.0	11.8	6.7	13.6
95	Hidden Valley #2	Hidden Val.Cr.	"	9mi.W.Estes P.	23-5N-74W	9550	" " " "	24.4	20.7	27.1	5.2	4.1	6.2
					Average for Drainage			34.6	27.5	38.0	8.5	5.4	9.9

*On adjacent drainage

**Above Denver

@Average for period of record

MISSOURI AND ARKANSAS RIVER WATERSHEDS

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								In.	In.	In.	In.	In.	In.
	ST. VRAIN RIVER												
41	Wild Basin	N.St.Vrain R.	Colo.	5mi.W.Allens P.	24-3N-74W	10000	Ry.Mtn.N.P.	27.2	25.1	34.0	6.1	5.2	7.0
	BOULDER CREEK												
5	E.Port.Moffat T.	S.Boulder Cr.	Colo.	East Portal	2-2S-74W	9400	Roosevelt	9.2	13.5	8.0	2.2	3.4	2.3
60	UniversityCamp#2	N.Boulder Cr.	"	5mi.SW.Ward	28-1N-73W	10300	"	34.5	32.6	51.7	9.8	8.2	16.6
				Average for Drainage				21.8	23.0	29.8	6.0	5.8	9.4
	CLEAR CREEK												
61	Loveland Pass #2	Clear Creek	Colo.	10mi.W.Georgetwn	27-4S-76W	10100	Arapaho	29.6	27.2	41.8	6.3	5.4	10.7
97	Grizzly Peak*	" "	"	1mi.W.Loveland P	2-5S-76W	11250	"	36.6	26.9	44.5	9.0	5.6	11.8
				Average for Drainage				33.1	27.6	43.2	7.6	5.5	11.2
	ARKANSAS RIVER												
19	Tennessee Pass	Tennessee Cr.	Colo.	Tennessee Pass	21-8S-80W	10200	San Isabel	24.6	19.0	33.0	4.5	3.1	7.2
21	Twin Lakes Tun.	Lake Creek	"	9mi.W.Twin Lakes	22-11S-82W	10500	"	26.1	19.9	34.4	5.9	4.1	7.1
42	Marshall Creek*	Poncha Cr.	"	Marshall Pass	24-48N-6E	10800	Gunnison	31.9	32.9	27.3	6.8	7.0	5.3
43	Poncha Creek	" "	"	" "	19-48N-7E	10500	San Isabel	25.2	26.3	17.4	6.4	6.1	4.7
72	Whiskey Creek#2	Whiskey Cr.	"	Whiskey Cr.Pass	37.2N105.2W	10300	MaxwellGr.	14.8	15.3	0.4	3.4	3.1	2.1
74	LaVeta Pass #2*	Cuchara Cr.	"	LaVeta Pass	22-29S-70W	9300	SanCristoGr	21.0	28.0	14.7	4.2	5.7	3.3
78	FourMile Park #2	Lake Creek	"	3mi.SW.Twin L.	23-11S-81W	9700	San Isabel	10.5	0.0	13.2	2.2	0.0	4.7
79	Fremont Pass #2	E.ForkArk.R.	"	Fremont Pass	2-8S-79W	11400	Arapaho	39.1	30.8	48.2	8.0	5.2	11.4
92	Monarch Pass	S.Fork Ark.R.	"	Monarch Pass	16-49N-6E	10500	San Isabel	45.5	40.8	42.2	9.6	8.2	10.8
				Average for Drainage				26.5	23.2	26.6	5.7	4.7	6.3

*On adjacent drainage

@Average for period of record

The following organizations cooperate in the snow surveys and irrigation water supply forecasts for the Colorado, Missouri-Arkansas and Rio Grande watersheds by furnishing funds or services.

STATE
- Colorado State Engineer
- Wyoming State Engineer
- Utah State Engineer
- New Mexico State Engineer
- Montana State Engineer
- Nebraska State Engineer
- Colorado Experiment Station
- Colorado Extension Service
- Montana Experiment Station
- Utah Experiment Station

FEDERAL
- Department of Agriculture
  - Forest Service
  - Soil Conservation Service
- Department of Interior
  - Bureau of Reclamation
  - Indian Service
  - Geological Survey
  - National Park Service
- Department of Commerce
  - Weather Bureau
- War Department
  - Army Engineer Corps

PUBLIC UTILITIES
- Colorado Public Service Company
- Western Colorado Power Company
- Montana Power Company
- Denver and Rio Grande Western R. R. Company

MUNICIPALITIES
- City of Bozeman
- City of Denver
- City of Boulder

WATER USERS ORGANIZATIONS
- Poudre Valley Water Users' Association
- Arkansas Valley Ditch Association
- Colorado River Water Conservation District

IRRIGATION PROJECTS
- Farmers Reservoir and Irrigation Company
- San Luis Valley Irrigation District
- Santa Maria Reservoir Company
- Costilla Land Company
- Uncompahgre Valley Water Users' Association
- Wyoming Development Company
- Goshen Irrigation District
- Kendrick Project
- Pathfinder Irrigation District
- Salt River Valley Water Users' Association
- San Carlos Irrigation and Drainage District

Many other organizations and individuals furnish valuable information for the snow survey reports. Their cooperation is gratefully acknowledged.